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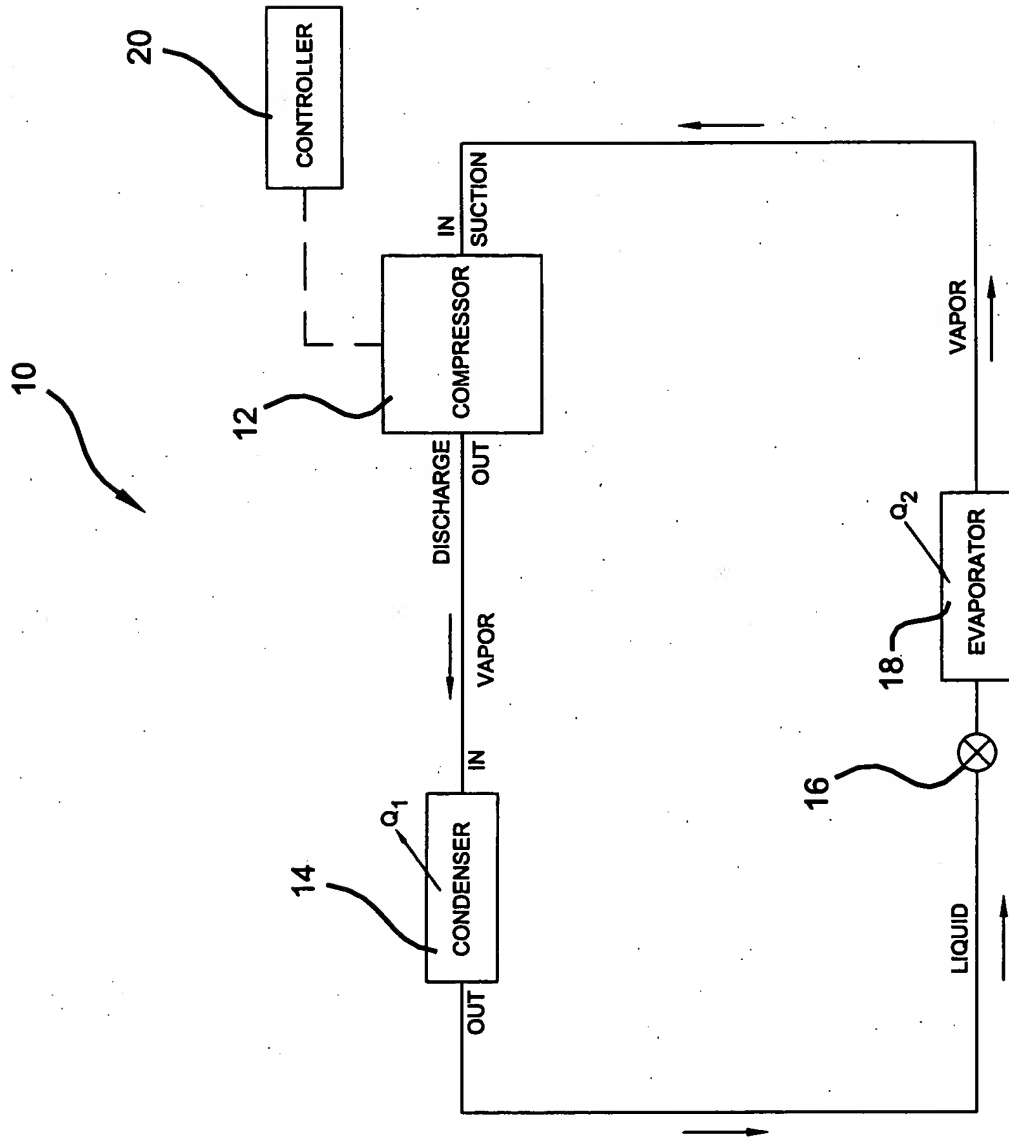


FIG 1

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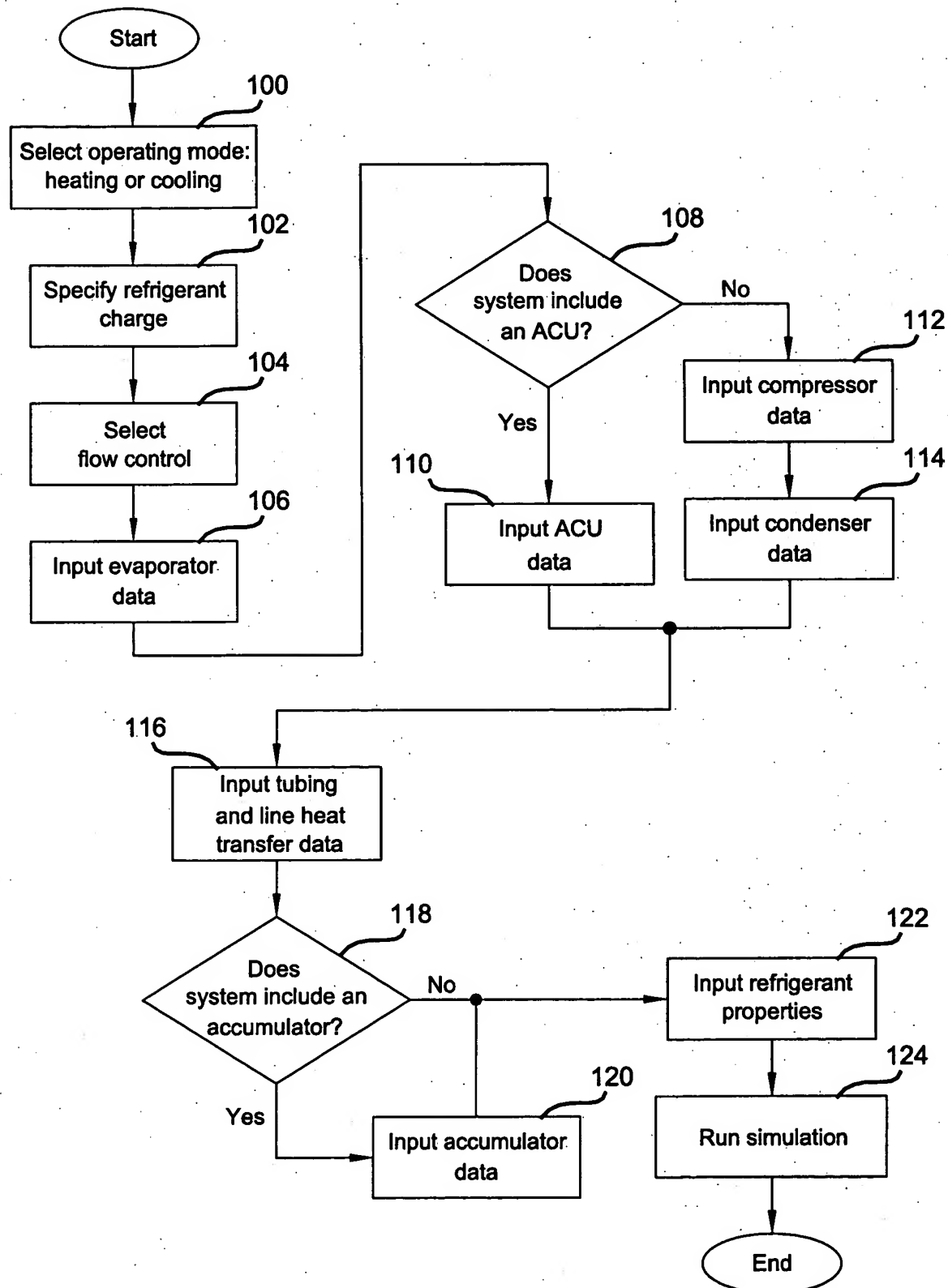


FIG 2

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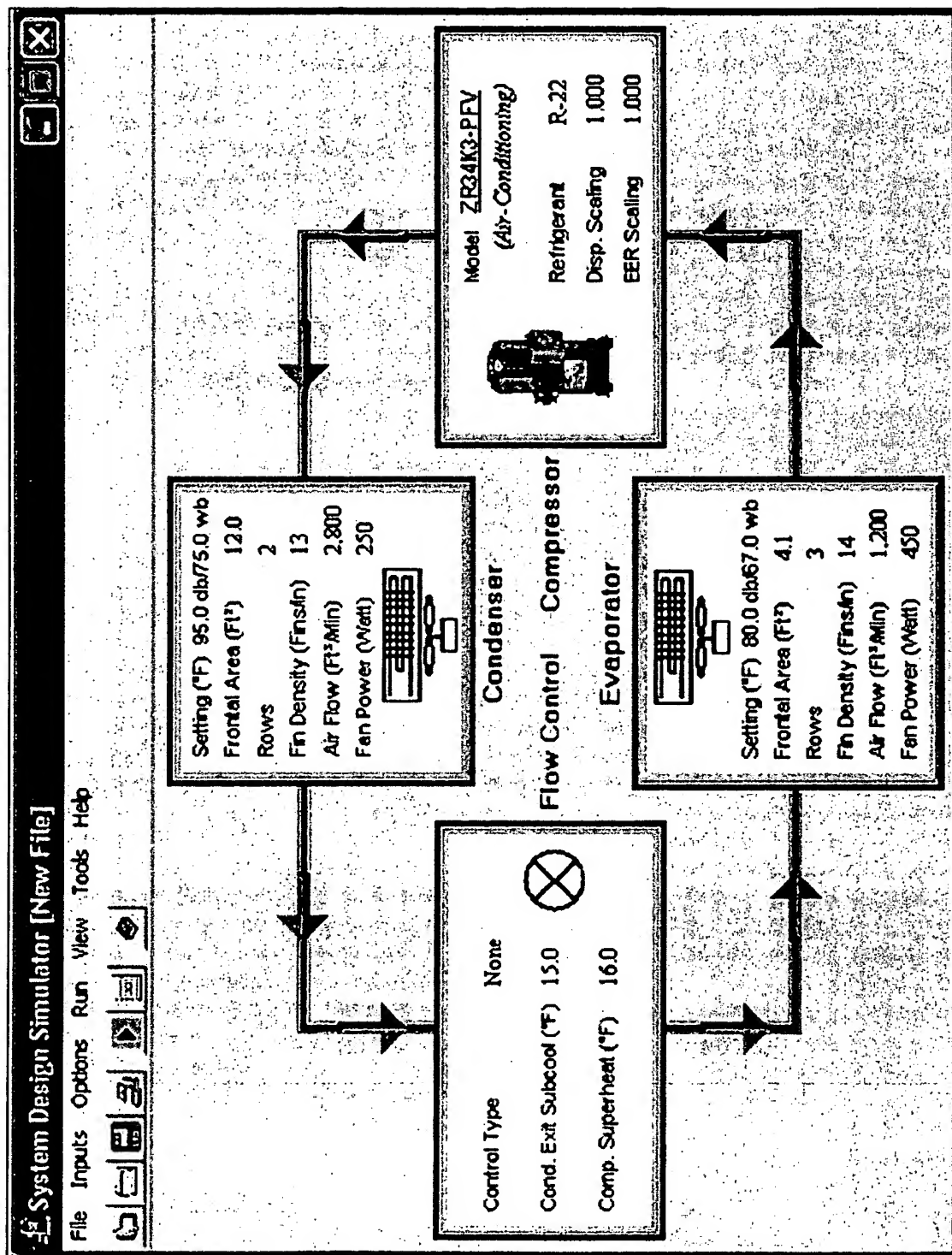


FIG 3



4/48

Title of Simulation

Emerson Climate Technologies  
High Efficiency Air-Conditioning Unit

System Type and Operation Mode

☐ Air-Conditioning/Heat Pump

☒ Cooling

☐ Heating

☐ Refrigeration

☐ Cooling

Note / Comment


Enter Note/Comments Here.

OK

Cancel

FIG 4

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**Refrigerant Charge**

Refrigerant Charge (lb)

☒ Subcooling at Condenser Exit (°F)

☐ Superheat at Compressor Inlet (°F)

FIG 5

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Flow Control Devices

Parameters / Device

☒ Subcooling / Superheat

☐ Capillary Tube

☐ Orifice

Subcooling / Superheat

Subcooling at Condenser Exit (°F) 15.0

Superheat at Compressor Inlet (°F) 16.0

2 OK Cancel

FIG 6

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Flow Control Devices

Parameters / Device

☐ Subcooling / Superheat  
☒ Capillary Tube  
☐ Orifice

Capillary Tube

Superheat at Compressor Inlet (°F)

16.0

Number of Capillary Tubes in Parallel

1

Inside Diameter of Capillary Tube (in)

0.113

Length of Capillary Tube (in)

80.0

OK

Cancel

FIG 7

8/48

Flow Control Devices

Parameters / Device

☐ Subcooling / Superheat  
☐ Capillary Tube  
☒ Orifice

Orifice

Superheat at Compressor Inlet (°F)

16.0

Number of Short Tube Orifices in Parallel

1

Inside Diameter of Short Tube Orifice (in)

0.072

Length of Short Tube Orifice (in)

0.50

OK

Cancel

FIG 8

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Evaporator

Entering Air Temperature / Fan    Heat Exchanger    Scaling Factors

**Entering Air Temperature**

Dry Bulb Temperature (°F)     Wet Bulb Temperature (°F)

**Fan**

Air Flow Rate (ft³/min)     Power Input (W)

?       OK    Cancel

FIG 9

| Evaporator  |                                     | Heat Exchanger                                  |                                   | Scaling Factors                       |  |
|---|-------------------------------------|---|-----------------------------------|---------------------------------------|--|
| Entering Air Temperature / Fan                          |                                     |   |                                   |                                       |  |
| <b>Heat Exchanger</b>                                   |                                     |   |                                   |                                       |  |
| Frontal Area ( $\text{ft}^2$ )                          | <input type="text" value="410"/>    |   |                                   |                                       |  |
| Number of Rows  | <input type="text" value="3"/>      |   |                                   |                                       |  |
| Number of Equivalent Parallel Refrigerant Circuits      | <input type="text" value="6"/>      |   |                                   |                                       |  |
| Horizontal Tube Spacing (Direction of Air Flow, x) (in) | <input type="text" value="0.9"/>    |   |                                   |                                       |  |
| Vertical Tube Spacing (Normal to Air Flow, y) (in)      | <input type="text" value="1.0"/>    |   |                                   |                                       |  |
| Number of Return Bends                                  | <input type="text" value="48"/>     |   |                                   |                                       |  |
| Fin Density (Fins/m)                                    | <input type="text" value="14"/>     |   |                                   |                                       |  |
| Outside Diameter of Tubing (in)                         | <input type="text" value="0.40"/>   |   |                                   |                                       |  |
| Inside Diameter of Tubing (in)                          | <input type="text" value="0.37"/>   |   |                                   |                                       |  |
| Tubing (Smooth, Rifled)                                 | <input type="text" value="Smooth"/> |   |                                   |                                       |  |
| Fin Type (Smooth, Wavy, Louvered)                       | <input type="text" value="Wavy"/>   |   |                                   |                                       |  |
|   |                                     | <p style="text-align: center;">Tube Spacing</p> |                                   |                                       |  |
|   |                                     | <input type="button" value="?"/>                | <input type="button" value="OK"/> | <input type="button" value="Cancel"/> |  |

**FIG 10**



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The screenshot shows a software window titled "Evaporator" with a standard Windows-style title bar (minimize, maximize, close buttons). The window contains a "Scaling Factors" dialog box. This dialog has two tabs: "Heat Exchanger" and "Entering Air Temperature / Fan", with the latter being the active tab. Inside the "Scaling Factors" dialog, there are two main sections: "Air Side" and "Refrigerant Side". Each section contains two input fields: "Heat Transfer" and "Pressure Drop". Both "Heat Transfer" and "Pressure Drop" fields in both sections are set to "1.00". At the bottom of the dialog, there are three buttons: "2" (likely a page indicator), "OK", and "Cancel".

| Side             | Parameter     | Value |
|------------------|---------------|-------|
| Air Side         | Heat Transfer | 1.00  |
|                  | Pressure Drop | 1.00  |
| Refrigerant Side | Heat Transfer | 1.00  |
|                  | Pressure Drop | 1.00  |

FIG 11



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Condenser

Entering Air Temperature / Fan    Heat Exchanger    Scaling Factors

**Entering Air Temperature**

Dry Bulb Temperature (°F)     Wet Bulb Temperature (°F)

**Fan**

Air Flow Rate (ft³/min)     Power Input (W)

?    OK    Cancel

FIG 12

**FIG 13**

14/48

**Condenser**

Entering Air Temperature / Fan      Heat Exchanger

**Scaling Factors**

| Side             | Parameter     | Value |
|------------------|---------------|-------|
| Air Side         | Heat Transfer | 1.00  |
|                  | Pressure Drop | 1.00  |
| Refrigerant Side | Heat Transfer | 1.00  |
|                  | Pressure Drop | 1.00  |

OK    Cancel    ?

FIG 14

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**Condenser**

Entering Air Temperature / Fan

**Heat Exchanger**

**Scaling Factors**

**Refrigeration Condenser In Use At Emerson Condensing Unit Division**

| Condenser P/N | Frontal Area<br>(Ft <sup>2</sup> ) | Rows | No. Of<br>Parallel Ckts. | Horz. Tube Spc.<br>(in) | Vert. Tube Spc.<br>(in) | No. Of<br>Return Bends | Fin |
|---------------|------------------------------------|------|--------------------------|-------------------------|-------------------------|------------------------|-----|
| 066-0069-00   | 1.02                               | 3    | 1                        | 0.63                    | 1.00                    | 13                     |     |
| 066-0073-00   | 1.32                               | 3    | 1                        | 0.87                    | 1.00                    | 13                     |     |
| 066-0075-00   | 1.92                               | 2    | 1                        | 0.87                    | 1.00                    | 23                     |     |
| 066-0101-00   | 14.60                              | 6    | 6                        | 1.08                    | 1.25                    | 78                     |     |
| 066-0101-01   | 14.60                              | 6    | 6                        | 1.08                    | 1.25                    | 78                     |     |
| 066-0101-02   | 14.60                              | 6    | 6                        | 1.08                    | 1.25                    | 78                     |     |
| 066-0200-00   | 0.76                               | 3    | 1                        | 1.08                    | 1.00                    | 13                     |     |
| 066-0205-00   | 0.83                               | 3    | 1                        | 0.63                    | 1.00                    | 15                     |     |
| 066-0216-00   | 2.12                               | 4    | 2                        | 0.75                    | 1.00                    | 30                     |     |
| 066-0218-00   | 2.11                               | 5    | 3                        | 0.75                    | 1.00                    | 36                     |     |
| 066-0225-00   | 2.97                               | 3    | 2                        | 0.75                    | 1.00                    | 25                     |     |
| 066-0226-00   | 1.32                               | 3    | 1                        | 0.87                    | 1.00                    | 13                     |     |
| 066-0234-00   | 1.92                               | 2    | 1                        | 0.87                    | 1.00                    | 11                     |     |
| 066-0247-00   | 2.90                               | 5    | 4                        | 0.75                    | 1.00                    | 40                     |     |
| 066-0247-AL   | 2.90                               | 4    | 4                        | 0.75                    | 1.00                    | 40                     |     |

Close Refrigeration Condenser List

?
OK
Cancel

To select a condenser, double click on the Condenser Part Number.

FIG 15

16/48

Compressor Selection

Search / Selection

Rated Capacity

Rated Power

Re-Rated Capacity

Re-Rated Power

Rated Current

Refrigerant

Application Type

Capacity

Hertz

Temperature Range

Evap. Temp. (°F)

Cond. Temp. (°F)

Voltage

Product Type

Results In

Model Name

Search

208-230V

CI13KQ-PFV

CI16KQ-PFV

CI18KQ-PFV

CI20KQ-PFV

CI24KQ-PFV

CI27KQ-PFV

CI32KQ-PFV

CIDQ-0200-PFV

CIEQ-0225-PFV

CR16K6-PFV

CR16K7-PFV

CR16KF-PFV

CR16KQ-PFV

CR18K6-PFV

ZR34K3-PFV

Form No. 2.22AC60-34.0

Rating Ref. 93-160P

Application Air Conditioning

Product Type Scroll

Record Date February 10, 1995

Const. Superheat (°F) 20

Subcooling (°F) 15

Capacity (Btu/h) 34,360

Power (Watt) 3,060

EER (Btu/Wh) 11.24

Production Status Available for sale to all U.S. customers. Please check with your local Copeland representative for international availability.

FIG 16



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**Compressor Selection** **ZR34K3-PFV**

Search / Selection    Rated Capacity    Rated Power    Re-Rated Capacity    Re-Rated Power    Rated Current

R refrigerant:     Hertz:     Phase:     Voltage:     Product Type:     Results In:

Application Type:     Temperature Range:     Model Name:     Search

Capacity:

☐ 50Hz ☐ 1 Phase ☐ 3 Phase

☐ 60Hz ☐ 1 Phase ☐ 3 Phase

☒ R22 ☐ 50Hz ☐ 1 Phase ☐ 3 Phase

☐ 60Hz ☐ 1 Phase ☐ 3 Phase

☒ 208-230V ☒ ZR34K3-PFV

☐ 265V ☐ ZR34K3-PFJ

**ZR34K3-PFV**

Form No.: 2.22AC60-34.0

Rating Ref.: 93-160P

Application: Air Conditioning

Product Type: Scroll

Record Date: February 10, 1995

Const. Superheat (°F): 20

Subcooling (°F): 15

Capacity (Btu/hr): @ 45 °F Evap., 130 °F Cond. 34,360

Power (Watt): 3,060

EER (Btu/W/h): 11.24

Production Status: Available for sale to all U.S. customers. Please check with your local Copeland representative for international availability.

FIG 17

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**Compressor Selection** **2R34K3-PFV**

Search / Selection **Rated Capacity** **Rated Power** **Re-Rated Capacity** **Re-Rated Power** **Rated Current**

**60 Hz Rated Capacity (Btu/hr)**

| Equip. Temp. --> | -10°F  | -5°F   | 0°F    | 5°F    | 10°F   | 15°F   | 20°F   | 25°F   | 30°F   | 35°F   |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 80°F Cond.       | 12,900 | 14,900 | 16,900 | 19,100 | 21,500 | 24,100 | 26,800 | 29,800 | 33,000 | 36,500 |
| 90°F Cond.       | 12,100 | 14,000 | 16,000 | 18,200 | 20,500 | 23,000 | 25,600 | 28,500 | 31,600 | 34,900 |
| 100°F Cond.      | 11,300 | 13,100 | 15,100 | 17,200 | 19,400 | 21,800 | 24,400 | 27,100 | 30,100 | 33,300 |
| 110°F Cond.      |        |        | 14,100 | 16,100 | 18,300 | 20,600 | 23,000 | 25,700 | 28,500 | 31,600 |
| 120°F Cond.      |        |        |        |        | 17,100 | 19,300 | 21,700 | 24,200 | 26,900 | 29,900 |
| 130°F Cond.      |        |        |        |        |        |        | 20,300 | 22,700 | 25,300 | 28,100 |
| 140°F Cond.      |        |        |        |        |        |        |        |        | 23,800 | 26,300 |
| 150°F Cond.      |        |        |        |        |        |        |        |        |        |        |

**Scale Performance**

Selection ☒ Displacement ☐ EER ☐ Both

Displacement Scaling Factor

EER Scaling Factor

☐ Scale Performance

☒ Envelope Check

Close

FIG 18

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Compressor Selection

ZR34K3-PFV

Search / Selection

Rated Capacity

Rated Power

Re-Rated Capacity

Re-Rated Power

Rated Current

Evap. Temp. →

80°F Cond.

90°F Cond.

100°F Cond.

110°F Cond.

120°F Cond.

130°F Cond.

140°F Cond.

150°F Cond.

|             | -10°F | -5°F  | 0°F   | 5°F   | 10°F  | 15°F  | 20°F  | 25°F  | 30°F  | 35°F  |
|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 80°F Cond.  | 1,730 | 1,730 | 1,730 | 1,730 | 1,720 | 1,710 | 1,710 | 1,700 | 1,690 | 1,680 |
| 90°F Cond.  | 1,950 | 1,950 | 1,950 | 1,950 | 1,940 | 1,930 | 1,930 | 1,920 | 1,910 | 1,900 |
| 100°F Cond. | 2,190 | 2,190 | 2,190 | 2,190 | 2,190 | 2,180 | 2,170 | 2,160 | 2,150 | 2,140 |
| 110°F Cond. |       |       | 2,470 | 2,470 | 2,470 | 2,460 | 2,450 | 2,440 | 2,430 | 2,410 |
| 120°F Cond. |       |       |       |       | 2,780 | 2,780 | 2,770 | 2,760 | 2,700 | 2,730 |
| 130°F Cond. |       |       |       |       |       |       | 3,140 | 3,120 | 3,110 | 3,090 |
| 140°F Cond. |       |       |       |       |       |       |       |       | 3,530 | 3,510 |
| 150°F Cond. |       |       |       |       |       |       |       |       |       |       |

60 Hz Rated Power (Watt)

Scale Performance

Selection

☒ Displacement
 ☐ EER
 ☐ Both

Displacement

Scaling Factor

1.00

EER

Scaling Factor

1.00

Scale Performance

☐ Scale Performance
 ☒ Envelope Check

Close

FIG 19



20/48

Compressor Selection

CR37KQ-PFV

Search / Selection

Rated Capacity

Rated Power

Re-Rated Capacity

Re-Rated Power

Rated Current

Refrigerant

All

Hertz

All

Phase

All

Voltage

All

Product Type

All

Results In

Explorer Tree

Application Type

Air-Conditioning

Temperature Range

Air-Conditioning

Model Name

Search

Capacity

34000

Btu/hr

+

10

%

Evap. Temp. (°F)

45

@

Cond. Temp. (°F)

130

CR32KQ-PFV

CR33KF-PFV

CR33KQ-PFV

CR34K6-PFV

CR34KF-PFV

CR34KQ-PFV

CR35K6-PFV

CR35KF-PFV

CR36KQ-PFV

☒ CR37KQ-PFV

CRG3-0250-PFV

CRGQ-0250-PFV

CRH3-0275-PFV

CRHQ-0275-PFV

CRI3-0290-PFV

CRIQ-0290-PFV

Form No.

2-12AC-365

Rating Ref.

98-510

Application

Air Conditioning

Product Type

Hermetic

Record Date

January 30, 1998

Cond. Superheat (°F)

20

Subcooling (°F)

15

@ 45 °F Evap., 130 °F Cond.

Capacity (Btu/hr)

36,840

Power (Watt)

3,640

EER (Btu/W/h)

10.13

Production Status

Available for sale to all U.S. customers. Please check with your local Copeland representative for international availability.

Close

FIG 20

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**Compressor Selection**

CR37KQ-PFV

Search / Selection

Rated Capacity

Rated Power

Re-Rated Capacity

Re-Rated Power

Rated Current

**50 Hz Rated Capacity (Btu/hr)**

| Evap. Temp. --> | -10°F | -5°F  | 0°F    | 5°F    | 10°F   | 15°F   | 20°F   | 25°F   | 30°F   | 35°F   |
|-----------------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|
| 60°F Cond.      | 7,800 | 9,460 | 11,290 | 13,460 | 15,850 | 18,430 | 21,250 | 24,320 | 27,560 | 30,960 |
| 90°F Cond.      | 6,750 | 8,220 | 9,960  | 11,950 | 14,190 | 16,680 | 19,340 | 22,240 | 25,400 | 28,720 |
| 100°F Cond.     | 5,880 | 7,170 | 8,720  | 10,540 | 12,620 | 14,940 | 17,510 | 20,250 | 23,240 | 26,480 |
| 110°F Cond.     |       |       | 7,660  | 9,300  | 11,210 | 13,360 | 15,690 | 18,340 | 21,170 | 24,150 |
| 120°F Cond.     |       |       |        | 8,170  | 9,880  | 11,790 | 14,030 | 16,430 | 19,090 | 22,000 |
| 130°F Cond.     |       |       |        |        | 8,630  | 10,380 | 12,370 | 14,610 | 17,020 | 19,750 |
| 140°F Cond.     |       |       |        |        |        | 8,960  | 10,790 | 12,780 | 15,020 | 17,510 |
| 150°F Cond.     |       |       |        |        |        |        | 9,210  | 10,960 | 13,030 | 15,270 |

**Scale Performance**

**Selection**

☐ Displacement

☐ EER

☐ Both

**Displacement**

Scaling Factor

**EER**

Scaling Factor

☒ Scale Performance

**Envelope Check**

**Close**

FIG 21

22/48

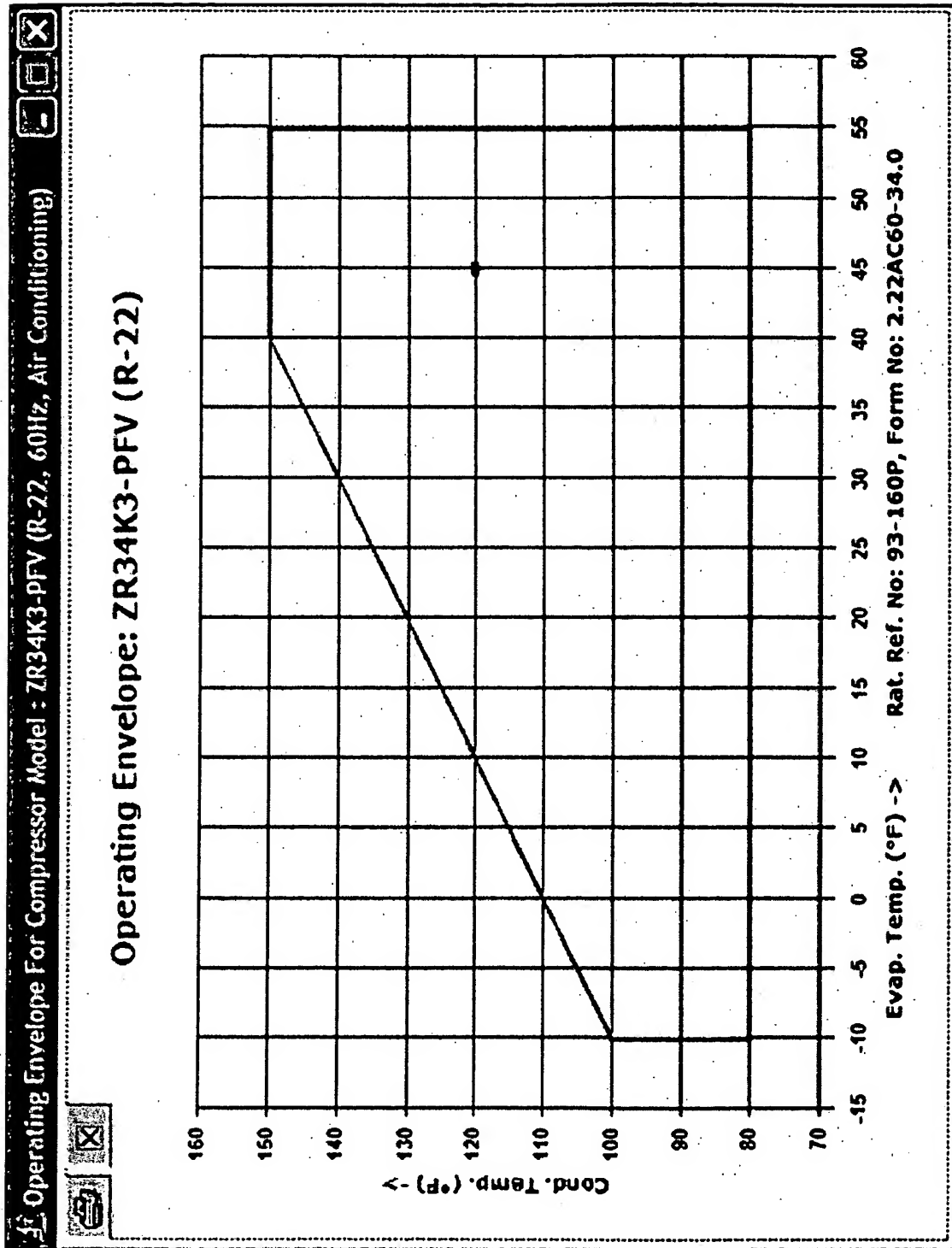


FIG 22

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Compressor Selection

7R34K3-PFV

Search / Selection

Rated Capacity

Rated Power

Re-Rated Capacity

Re-Rated Power

Rated Current

Enter Performance Point

Condensing Temp. (°F)

120

Evaporator Temp. (°F)

45

Rated Performance

Capacity (Btu/hr)

36,500

Power (Watt)

2,700

Current (Amp)

12.0

Re-Rated Performance

Capacity (Btu/hr)

34,900

Power (Watt)

2,700

Current (Amp)

12.0

Re-Rate Performance

Rated Conditions

Constant Superheat (°F)

20

Subcooling (°F)

15

Re-Rated Conditions

Constant Superheat (°F)

20

Subcooling (°F)

5

Matrix

Single Point

Re-Rate

Close

FIG 23

24/48

| Tubing And Line Heat Transfer                        |      |
|--|------|
| Inside Tubing Diameter                               |      |
| Liquid Line (in)                                     | 0.38 |
| Vapor Line From Evaporator to Compressor (in)        | 0.75 |
| Discharge Line From Compressor to Condenser (in)     | 0.50 |
| Equivalent Tubing Length                             |      |
| Liquid Line (ft)                                     | 38.0 |
| Vapor Line From Evaporator to Compressor (ft)        | 38.0 |
| Discharge Line From Compressor to Condenser (ft)     | 5.0  |
| Shell Loss / Heat Transfer                           |      |
| Compressor Shell Heat Loss Rate Factor               | 0.10 |
| Heat Loss Rate in Compressor Discharge Line (Btu/hr) | 1000 |
| Heat Gain in Compressor Suction Line (Btu/hr)        | 200  |
| Heat Loss Rate in Liquid Line (Btu/hr)               | 200  |
| OK Cancel  |      |

FIG 24

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| Tubing And Line Heat Transfer                          |      |
|--|------|
| Inside Tubing Diameter                                 |      |
| Liquid Line (in)                                       | 0.38 |
| Vapor Line From Reversing Valve to Condenser (in)      | 0.75 |
| Vapor Line From Reversing Valve to Evaporator (in)     | 0.75 |
| Suction Line From Reversing Valve to Compressor (in)   | 0.75 |
| Discharge Line From Compressor to Reversing Valve (in) | 0.50 |
| Equivalent Tubing Length                               |      |
| Liquid Line (ft)                                       | 38.0 |
| Vapor Line From Reversing Valve to Condenser (ft)      | 38.0 |
| Vapor Line From Reversing Valve to Evaporator (ft)     | 3.0  |
| Suction Line From Reversing Valve to Compressor (ft)   | 3.0  |
| Discharge Line From Compressor to Reversing Valve (ft) | 5.0  |
| Shell Loss / Heat Transfer                             |      |
| Compressor Shell Heat Loss Rate Factor                 | 0.10 |
| Heat Loss Rate In Compressor Discharge Line (Btu/hr)   | 1000 |
| Heat Gain In Compressor Suction Line (Btu/hr)          | 200  |
| Heat Loss Rate In Liquid Line (Btu/hr)                 | 200  |

FIG 25



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**Accumulator**

### Emerson Flow Controls Accumulator

| No. | Accumulator P/N | Height<br>(in) | Diameter<br>(in) | Int. Vol.<br>(in <sup>3</sup> ) | J-Tube Inn. Dia.<br>(in) | Lower Hole Dia.<br>(in) | Upper Hole Dia.<br>(in) | Hole Spacing<br>(in) |
|-----|-----------------|----------------|------------------|---------------------------------|--------------------------|-------------------------|-------------------------|----------------------|
| 1   | 3243-A-AS-389   | 8.0            | 3.0              | 56.6                            | 0.50                     | 0.06                    | 0.06                    | 6.3                  |
| 2   | 3244-A-AS-3105  | 10.0           | 3.0              | 70.7                            | 0.63                     | 0.06                    | 0.06                    | 8.3                  |
| 3   | 3245-A-AS-3125  | 12.0           | 3.0              | 84.8                            | 0.63                     | 0.06                    | 0.06                    | 10.3                 |
| 4   | 3246-A-AS-3126  | 12.0           | 3.0              | 84.8                            | 0.75                     | 0.06                    | 0.06                    | 10.3                 |
| 5   | 3247-A-AS-3145  | 15.0           | 3.0              | 106.0                           | 0.63                     | 0.06                    | 0.06                    | 12.3                 |
| 6   | 3248-A-AS-3146  | 14.0           | 3.0              | 99.0                            | 0.75                     | 0.06                    | 0.06                    | 12.3                 |
| 7   | 3249-A-AS-464   | 6.0            | 4.0              | 75.4                            | 0.50                     | 0.06                    | 0.06                    | 4.3                  |
| 8   | 3250-A-AS-465   | 6.0            | 4.0              | 75.4                            | 0.63                     | 0.06                    | 0.06                    | 4.3                  |
| 9   | 3251-A-AS-4105  | 10.0           | 4.0              | 125.7                           | 0.63                     | 0.06                    | 0.06                    | 8.3                  |
| 10  | 3252-A-AS-4106  | 10.0           | 4.0              | 125.7                           | 0.75                     | 0.06                    | 0.06                    | 8.3                  |

To select an accumulator, double click on the accumulator part number.

**Close Accumulator List**

☐ Emerson Accumulator Selected

Accumulator Part Number: N/A

**Compressor**

Estimated Free Internal Volume (in<sup>3</sup>): 349

It is recommended that the user select a compressor for the system before selecting an accumulator or entering accumulator geometry.  
NOTE: Actual free internal volume of the compressor is not available.

**OK** **Cancel**

FIG 26

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Accumulator

Accumulator Geometry

Shell

Internal Height (in), H

6.0

Internal Diameter (in), D

4.0

D-tube

Internal Diameter (in), D<sub>i</sub>

0.63

Oil Return Hole Lower Diameter (in), D<sub>l</sub>

0.06

Oil Return Hole Upper Diameter (in), D<sub>u</sub>

0.06

Spacing Between Oil Return Holes (in), S

4.3

Compressor

Estimated Free Internal Volume (in<sup>3</sup>)

349

Show Emerson Accumulator List

☐ Emerson Accumulator Selected  
 Accumulator Part Number: N/A

?

OK

Cancel

It is recommended that the user select a compressor for the system before selecting an accumulator or entering accumulator geometry.  
 NOTE: Actual free internal volume of the compressor is not available.

FIG 27



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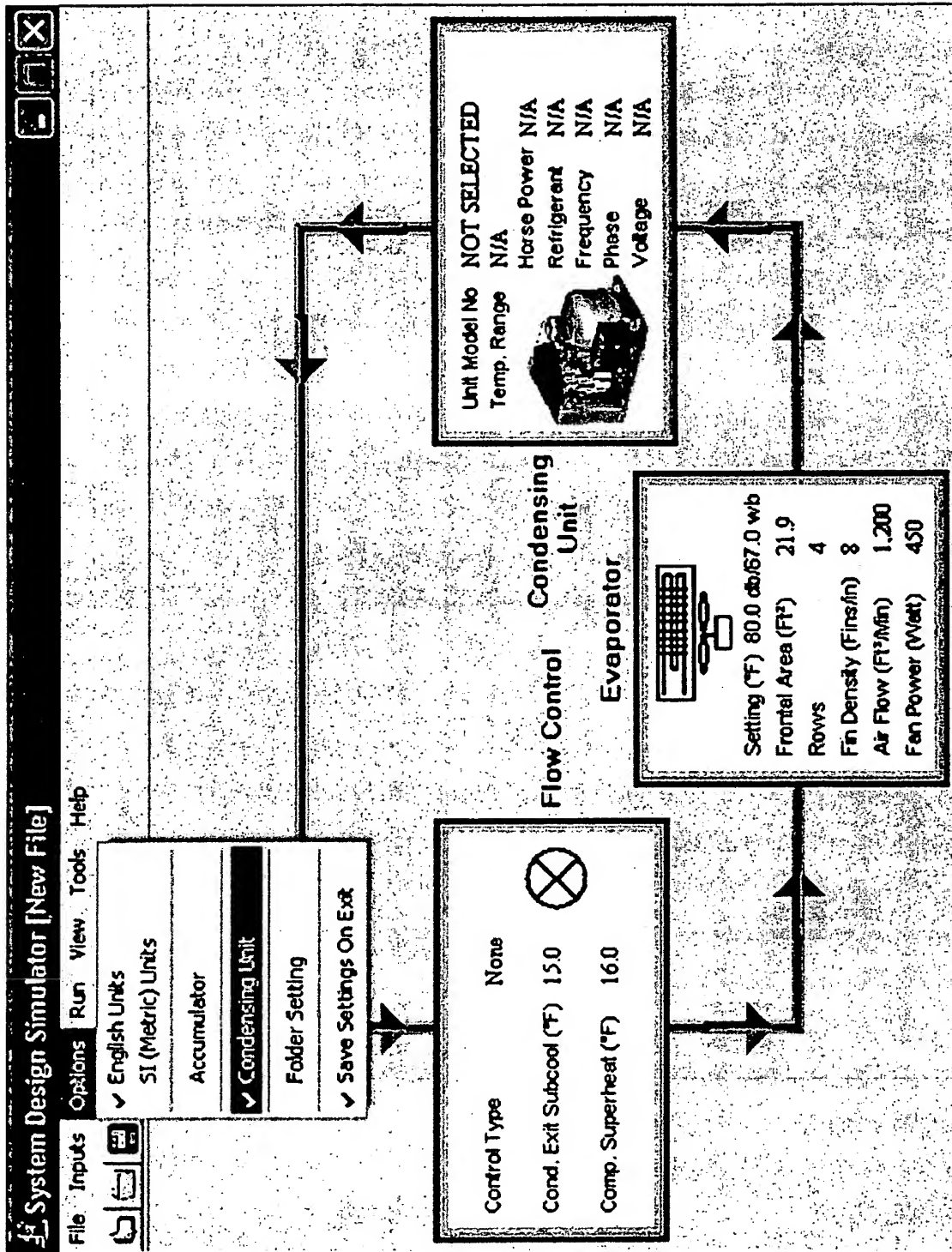


FIG 28

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**Condensing Unit Selection**

Search / Selection      Condensing Unit Info      Components Detail

---

**Search Criteria**

Refrigerant:       Temperature Range:       Hertz:       Phase:       Voltage:

Physical Dimensions: Length (in)  (Min)  (Max)      Width (in)  (Min)  (Max)      Height (in)  (Min)  (Max)

Nominal HP:  HP      Capacity:  (Btu/hr)      Ambient Temp. (°F)       Evap. Temp. (°F)

Compressor:       Unit Model:       Availability:       Results In:      

---

**Search Results**

| No. | Condensing Unit   | Refrigerant | Hertz | Phase | Nominal HP | Temp. Range |
|-----|-------------------|-------------|-------|-------|------------|-------------|
| 1   | C3AH-0303-TAC-001 | R-22        | 60    | 3     | 3          | High        |
| 2   | C3AH-0303-TAC-007 | R-22        | 60    | 3     | 3          | High        |
| 3   | C3AH-0303-TAC-020 | R-22        | 60    | 3     | 3          | High        |
| 4   | C3AH-0303-TAC-042 | R-22        | 60    | 3     | 3          | High        |
| 5   | C3AH-0303-TAD-001 | R-22        | 60    | 3     | 3          | High        |
| 6   | C3AH-0303-TAD-006 | R-22        | 60    | 3     | 3          | High        |
| 7   | C3AH-0303-TAD-020 | R-22        | 60    | 3     | 3          | High        |
| 8   | C3AH-0303-TAD-042 | R-22        | 60    | 3     | 3          | High        |
| 9   | C3AH-0303-TAD-106 | R-22        | 60    | 3     | 3          | High        |
| 10  | C3AH-0303-TAD-107 | R-22        | 60    | 3     | 3          | High        |
| 11  | F3AD-A325-CFV-001 | R-22        | 60    | 1     | 3-1/4      | High        |

**84 Units Found.**     

FIG 29

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**Condensing Unit Selection**

Search / Selection: C3AH-0303-TAC-001 Components Detail

**Search Criteria**

Refrigerant: R-22 Temperature Range: All Hertz: All Phase: All Voltage: All

Physical Dimensions: Length (in): (Min) (Max) Width (in): (Min) (Max) Height (in): (Min) (Max)

Nominal HP: All HP Capacity: 35978 (Btu/hr) Ambient Temp. (°F): 100 Evap. Temp. (°F): 45

Compressor: Unit Model: Availability: All Results In: Spread Sheet Search

**Search Results**

| No. | Condensing Unit   | Refrigerant | Hertz | Phase | Nominal HP | Temp. Range |
|-----|-------------------|-------------|-------|-------|------------|-------------|
| 1   | C3AH-0303-TAC-001 | R-22        | 60    | 3     | 3          | High        |
| 2   | C3AH-0303-TAC-007 | R-22        | 60    | 3     | 3          | High        |
| 3   | C3AH-0303-TAC-020 | R-22        | 60    | 3     | 3          | High        |
| 4   | C3AH-0303-TAC-042 | R-22        | 60    | 3     | 3          | High        |
| 5   | C3AH-0303-TAD-001 | R-22        | 60    | 3     | 3          | High        |
| 6   | C3AH-0303-TAD-006 | R-22        | 60    | 3     | 3          | High        |
| 7   | C3AH-0303-TAD-020 | R-22        | 60    | 3     | 3          | High        |
| 8   | C3AH-0303-TAD-042 | R-22        | 60    | 3     | 3          | High        |
| 9   | C3AH-0303-TAD-106 | R-22        | 60    | 3     | 3          | High        |
| 10  | C3AH-0303-TAD-107 | R-22        | 60    | 3     | 3          | High        |
| 11  | F3AD-A325-CFV-001 | R-22        | 60    | 1     | 3-1/4      | High        |

**Close**

**Summary:**  
 Voltage: 208/230  
 Compressor: ERF1-0310-TAC  
 Length (in): 39.0  
 Width (in): 30.0  
 Height (in): 29.5  
 Availability: Std. US OEM

FIG 30

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| Condensing Unit Selection |               | C3AH-0303-TAC-001                    |  | Components Detail |  |
|---------------------------|---------------|--------------------------------------|--|-------------------|--|
| Search / Selection        |               | Performance                          |  |                   |  |
| Record Date               | 4/5/2002      | Air Flow Rate (Ft <sup>3</sup> /Min) |  | 4,090             |  |
| Refrigerant               | R-22          | Return Gas Temp. (°F)                |  | 65.0              |  |
| Compressor                | ERF1-0310-TAC | Subcooling (°F)                      |  | 5.0               |  |
| 90 °F Amb.                |               | 100 °F Amb.                          |  | 110 °F Amb.       |  |
| 120 °F Amb.               |               |                                      |  |                   |  |
| Evaporator Temp. (°F)     |               | Capacity (Btu/hr)                    |  |                   |  |
| 0                         |               | 14,750                               |  |                   |  |
| 5                         |               | 16,780                               |  |                   |  |
| 10                        |               | 18,950                               |  |                   |  |
| 15                        |               | 21,300                               |  |                   |  |
| 20                        |               | 23,800                               |  |                   |  |
| 25                        |               | 26,470                               |  |                   |  |
| 30                        |               | 29,300                               |  |                   |  |
| 35                        |               | 32,290                               |  |                   |  |
| 40                        |               | 35,440                               |  |                   |  |
| 45                        |               | 38,730                               |  |                   |  |

| Electrical               |         | Mechanical                          |         |
|--------------------------|---------|-------------------------------------|---------|
| Frequency (Hz)           | 60      | Length (in)                         | 39.0    |
| Phase                    | Three   | Width (in)                          | 30.0    |
| Voltage                  | 208/230 | Height (in)                         | 29.5    |
| Maximum Fuse Size (amps) | 25.0    | Ship Weight (lb)                    | 403     |
| Minimum Current Ampacity | 19.0    | Liquid Connection Size (in) / Type  | 1/2 F   |
|                          |         | Suction Connection Size (in) / Type | 1-1/8 S |
|                          |         | Discharge Line Size (in)            | 0.63    |

FIG 31

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**Condensing Unit Selection**

Search / Selection: F3AD-A325-CFV-001

Components Detail: Accumulator

Compressor: Condenser

**CRK3-0325-PFV**  
High Temperature

**Rating Conditions**  
65 °F Return Gas  
0 °F Subcooling  
95 °F Ambient Air

**R-22**  
60 HZ  
1 Phase  
208/230 Volts

**Capacity (Btu/hr)**  
Evaporating Temperature (°F)

| Cond. Temp. (°F) | 0      | 5      | 10     | 15     | 20     | 25     | 30     | 35     | 40     | 45     | 50     | 55     |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 70               | 19,000 | 22,300 | 26,000 | 30,100 | 34,800 | 39,800 | 45,400 | 51,400 | 58,000 | 65,100 | 72,800 | 81,100 |
| 80               | 16,900 | 20,000 | 23,500 | 27,500 | 31,900 | 36,700 | 42,000 | 47,800 | 54,100 | 61,000 | 68,400 | 76,300 |
| 90               | 14,900 | 17,800 | 21,100 | 24,900 | 29,000 | 33,600 | 38,600 | 44,100 | 50,100 | 56,700 | 63,700 | 71,300 |
| 100              | 13,100 | 15,800 | 18,900 | 22,300 | 26,200 | 30,500 | 35,200 | 40,400 | 46,100 | 52,300 | 59,000 | 66,200 |
| 110              | 11,500 | 13,900 | 16,700 | 19,900 | 23,400 | 27,400 | 31,800 | 36,700 | 42,000 | 47,800 | 54,100 | 60,900 |
| 120              | 12,300 | 14,700 | 17,600 | 20,800 | 24,400 | 28,400 | 32,900 | 37,900 | 43,300 | 49,200 | 55,600 | 62,500 |
| 130              | 13,000 | 15,400 | 18,300 | 21,500 | 25,000 | 29,000 | 33,500 | 38,500 | 44,000 | 50,000 | 56,500 | 63,400 |
| 140              | 13,500 | 16,000 | 18,800 | 22,000 | 25,600 | 29,600 | 34,100 | 39,100 | 44,600 | 50,600 | 57,100 | 64,000 |

Close

FIG 32

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Condensing Unit Selection

Search / Selection

C3AH-0303-TAC-001

Components Detail

Compressor

Condenser

Accumulator

| Cond. Temp.<br>(°F) | 0      | 5      | 10     | 15     | 20     | 25     | 30     | 35     | 40     | 45     | 50     | 55     |
|---------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 90                  | 16,700 | 19,200 | 21,900 | 24,800 | 28,000 | 31,500 | 35,300 | 39,300 | 43,700 | 48,400 | 53,400 | 58,800 |
| 100                 | 15,300 | 17,600 | 20,100 | 22,900 | 26,000 | 29,300 | 32,900 | 36,800 | 40,900 | 45,400 | 50,200 | 55,400 |
| 110                 | 13,800 | 16,000 | 18,400 | 21,000 | 23,900 | 27,000 | 30,400 | 34,100 | 38,000 | 42,300 | 46,900 | 51,700 |
| 120                 | 12,400 | 14,400 | 16,600 | 19,100 | 21,700 | 24,600 | 27,800 | 31,300 | 35,000 | 39,000 | 43,300 | 47,900 |
| 130                 | 11,000 | 12,800 | 14,800 | 17,100 | 19,500 | 22,200 | 25,100 | 28,300 | 31,700 | 35,400 | 39,500 | 43,800 |
| 140                 | 9,660  | 11,200 | 13,000 | 15,000 | 17,200 | 19,600 | 22,200 | 25,100 | 28,300 | 31,700 | 35,400 | 39,400 |

POWER (Watt)

Evaporating Temperature (°F)

| Cond. Temp.<br>(°F) | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    | 40    | 45    | 50    | 55    |
|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 70                  | 1,900 | 1,980 | 2,060 | 2,120 | 2,180 | 2,230 | 2,260 | 2,300 | 2,320 | 2,340 | 2,350 | 2,350 |
| 80                  | 2,080 | 2,190 | 2,280 | 2,360 | 2,440 | 2,500 | 2,560 | 2,610 | 2,650 | 2,680 | 2,700 | 2,720 |
| 90                  | 2,220 | 2,350 | 2,470 | 2,570 | 2,670 | 2,750 | 2,830 | 2,900 | 2,950 | 3,000 | 3,040 | 3,080 |
| 100                 | 2,310 | 2,470 | 2,610 | 2,740 | 2,860 | 2,970 | 3,070 | 3,160 | 3,240 | 3,310 | 3,370 | 3,420 |
| 110                 | 2,360 | 2,550 | 2,720 | 2,880 | 3,020 | 3,160 | 3,280 | 3,390 | 3,500 | 3,590 | 3,670 | 3,740 |
| 120                 | 2,360 | 2,580 | 2,780 | 2,970 | 3,150 | 3,310 | 3,460 | 3,600 | 3,730 | 3,840 | 3,950 | 4,040 |
| 130                 | 2,320 | 2,570 | 2,800 | 3,030 | 3,230 | 3,430 | 3,610 | 3,780 | 3,930 | 4,080 | 4,210 | 4,330 |
| 140                 | 2,220 | 2,510 | 2,780 | 3,040 | 3,280 | 3,510 | 3,720 | 3,920 | 4,110 | 4,280 | 4,440 | 4,590 |

FIG 33



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Condensing Unit Selection

Search / Selection

Compressor

C3AH-0303-TAC-001

Components Detail

Condenser

Accumulator

Coil Geometry

|  |        |
|--|--------|
| Frontal Area (Ft <sup>2</sup> )                      | 4.79   |
| Number of Rows                                       | 3      |
| Number of Equivalent Parallel Circuits               | 3      |
| Horizontal Tube Spacing (Direction of Air Flow) (in) | 1.08   |
| Vertical Tube Spacing (Normal to Air Flow) (in)      | 1.25   |
| Number of Return Bends                               | 30     |
| Fin Density (Fins/in)                                | 8      |
| Outside Diameter of Tubing (in)                      | 0.38   |
| Inside Diameter of Tubing (in)                       | 0.34   |
| Tubing   | Smooth |
| Fin Type   | Wavy   |

Fan

|                                      |       |
|--------------------------------------|-------|
| Air Flow Rate (Ft <sup>3</sup> /Min) | 4,090 |
| Motor Power Input (Watt)             | 510   |

Entering Air: Dry Bulb Temperature (°F) 95.0 Wet Bulb Temperature (°F) 75.0

Close

FIG 34

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**Condensing Unit Selection**

Search / Selection: C3AH-0303-TAC-001      Components Detail

---

**Search Criteria**

Refrigerant: [R-22]      Temperature Range: [All]      Hertz: [All]      Phase: [All]      Voltage: [All]

---

**C3AH-0303-TAC-001 Features**

☒ UL Listed      ☒ Fan Guard  
☒ Condenser End Cover      ☒ Dual Press. Control  
☒ Conduit      ☒ Shut Off Valve  
☒ Contactor

---

**Search Results**

| No. | Condensing Unit   | Refrigerant | Hertz | Phase | Nominal HP | Temp. Range |
|-----|-------------------|-------------|-------|-------|------------|-------------|
| 1   | C3AH-0303-TAC-001 | R-22        | 60    | 3     | 3          | High        |
| 2   | C3AH-0303-TAC-007 | R-22        | 60    | 3     | 3          | High        |
| 3   | C3AH-0303-TAC-020 | R-22        | 60    | 3     | 3          | High        |
| 4   | C3AH-0303-TAC-042 | R-22        | 60    | 3     | 3          | High        |
| 5   | C3AH-0303-TAD-001 | R-22        | 60    | 3     | 3          | High        |
| 6   | C3AH-0303-TAD-006 | R-22        | 60    | 3     | 3          | High        |
| 7   | C3AH-0303-TAD-020 | R-22        | 60    | 3     | 3          | High        |
| 8   | C3AH-0303-TAD-042 | R-22        | 60    | 3     | 3          | High        |
| 9   | C3AH-0303-TAD-106 | R-22        | 60    | 3     | 3          | High        |
| 10  | C3AH-0303-TAD-107 | R-22        | 60    | 3     | 3          | High        |
| 11  | F3AD-A325-CFV-001 | R-22        | 60    | 1     | 3-1/4      | High        |

---

**C3AH-0303-TAC-001 Details**

Voltage: 208/230  
 Compressor: ERF-0310-TAC  
 Length (in): 39.0  
 Width (in): 30.0  
 Height (in): 29.5  
 Availability: Std. US OEM

**Close**

FIG 35



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**Condensing Unit Selection**

Search / Selection: C3AH-0303-TAD-106 Components Detail

**Search Criteria**

Refrigerant: R-22 Temperature Range: All Hertz: All Phase: All Voltage: All

Features Comparison: C3AH-0303 TAD-020/60Hz TAD-106/60Hz

☒ UL Recognized  
☒ UL Listed  
☒ Condenser End Cover  
☒ Conduit  
☒ Contactor  
☒ Fan Guard  
☒ Dual Press. Control  
☒ Shut Off Valve

**Search Results**

| No. | Condensing Unit   | Refrigerant | Hertz | Phase | Nominal HP | Temp. Range |
|-----|-------------------|-------------|-------|-------|------------|-------------|
| 1   | C3AH-0303-TAC-001 | R-22        | 60    | 3     | 3          | High        |
| 2   | C3AH-0303-TAC-007 | R-22        | 60    | 3     | 3          | High        |
| 3   | C3AH-0303-TAC-020 | R-22        | 60    | 3     | 3          | High        |
| 4   | C3AH-0303-TAC-042 | R-22        | 60    | 3     | 3          | High        |
| 5   | C3AH-0303-TAD-001 | R-22        | 60    | 3     | 3          | High        |
| 6   | C3AH-0303-TAD-006 | R-22        | 60    | 3     | 3          | High        |
| 7   | C3AH-0303-TAD-020 | R-22        | 60    | 3     | 3          | High        |
| 8   | C3AH-0303-TAD-042 | R-22        | 60    | 3     | 3          | High        |
| 9   | C3AH-0303-TAD-106 | R-22        | 60    | 3     | 3          | High        |
| 10  | C3AH-0303-TAD-107 | R-22        | 60    | 3     | 3          | High        |
| 11  | F3AD-A325-CFV-001 | R-22        | 60    | 1     | 3-1/4      | High        |

**Details for C3AH-0303-TAD-106:**

Voltage: 460  
 Compressor: ERF1-0310-TAD  
 Length (in): 39.0  
 Width (in): 30.0  
 Height (in): 29.5  
 Availability: Custom US OEM

Close

FIG 36

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**Condensing Unit Selection**

Search / Selection C3AH-0303-TAD-001 Components Detail

**Search Criteria**

Refrigerant: R-22 Temperature Range: All Hertz: All Phase: All Voltage: All

Physical Dimensions: Length (in): (Min) (Max) Width (in): (Min) (Max) Height (in): (Min) (Max)

Nominal HP: All HP Capacity: 35378 (Btu/hr) @ Ambient Temp. (°F): 100 Evap. Temp. (°F): 45

Compressor: Unit Model: Availability: All Results In: Explorer Tree Search

**Search Results**

C-Line R-22 60 Hz  
F-Line R-22 60 Hz  
T-Line R-22 60 Hz  
V-Line R-22 60 Hz

Close

Voltage: 460  
Compressor: ERF1-0310-TAD  
Length (in): 39.0  
Width (in): 30.0  
Height (in): 29.5  
Availability: Std. US OEM

FIG 37

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Refrigerants Properties

Saturated Properties

Vapor Properties

Liquid Properties

Refrigerant

R-22

Temperature To Pressure

Input

Temperature (°F)

Calculate

Output

Pressure (psia)

Pressure To Temperature

Input

Pressure (psia)

90.69

Calculate

Output

Temperature (°F)

45.00

Clear

Close

FIG 38

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**Refrigerants Properties**

Saturated Properties | Vapor Properties | Liquid Properties

Refrigerant: **R-22**

**Inputs**

Pressure (psia): **90.69**

Temperature (°F): **55**

**Specific Volume / Enthalpy / Entropy**

**Calculate**

**Outputs**

Specific Volume (ft³/lb): **0.624**

Enthalpy (Btu/lb): **110.43**

Entropy (Btu/lb·°R): **0.420**

**Enthalpy**

**Inputs**

Pressure (psia):

Enthalpy (Btu/lb·°R):

**Calculate**

**Output**

Enthalpy (Btu/lb):

**Clear** **Close**

FIG 39



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**Refrigerants Properties**

**Saturated Properties**

Refrigerant: **R-22**

**Inputs**

Pressure (psia): **90.69**

Temperature (°F): **55**

**Calculate**

**Outputs**

Specific Volume (ft³/lb): **0.624**

Enthalpy (Btu/lb): **110.43**

Entropy (Btu/lb-°R): **0.420**

**Liquid Properties**

**Enthalpy**

**Inputs**

Pressure (psia):

Entropy (Btu/lb-°R):

**Calculate**

**Output**

Enthalpy (Btu/lb):

**Clear** **Close**

FIG 40

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**Copeland Corporation**  
UnitSim - System Design Tool Inputs

**General Information**

System: Air-Conditioning      Run Mode: Cooling      Refrigerant: R-22

**Inlet Air Conditions**

Entering (Dry bulb/Wet bulb): 80.0°F / 67.0°F      **Condenser**      95.0°F / 75.0°F

Air Flow Rate: 1200 FPM      2800 FPM

Fan Power: 450 Watt      250 Watt

**Other Parameters**

Shell Heat Loss Factor: 0.100

Discharge Line Loss (Btu/hr): 1,000

Suction Line Gain (Btu/hr): 200

Liquid Line Loss (Btu/hr): 200

**Heat Exchanger Details**

**Evaporator**      **Condenser**

Frontal Area: 4.10 Ft<sup>2</sup>      12.00 Ft<sup>2</sup>

Number of Rows: 3      2

No. of Equi. Parallel Circuits: 6      4

Fin Type: Wavy      Wavy

Fin Density: 14 Fins/in      13 Fins/in

Tubing: Smooth      Smooth

**Compressor Performance Scaling Factors**

Refrigerant-Side Heat Transfer: 1,000      1,000

Refrigerant-Side Pressure Drop: 1,000      1,000

Air-Side Heat Transfer: 1,000      1,000

Air-Side Pressure Drop: 1,000      1,000

**Compressor Details**

Model: ZR34K-PFV

Type: Air-Conditioning

Application: Air-Conditioning

Voltage: 230

Frequency: 60

Phase: 1

**Compressor Performance Scaling Factors**

Displacement: 1,000

EER: 1,000

**Flow Control**

Selected Option: Subcooling/Superheat      Subcooling: 15.0 °F      Superheat: 15.0 °F

FIG 41



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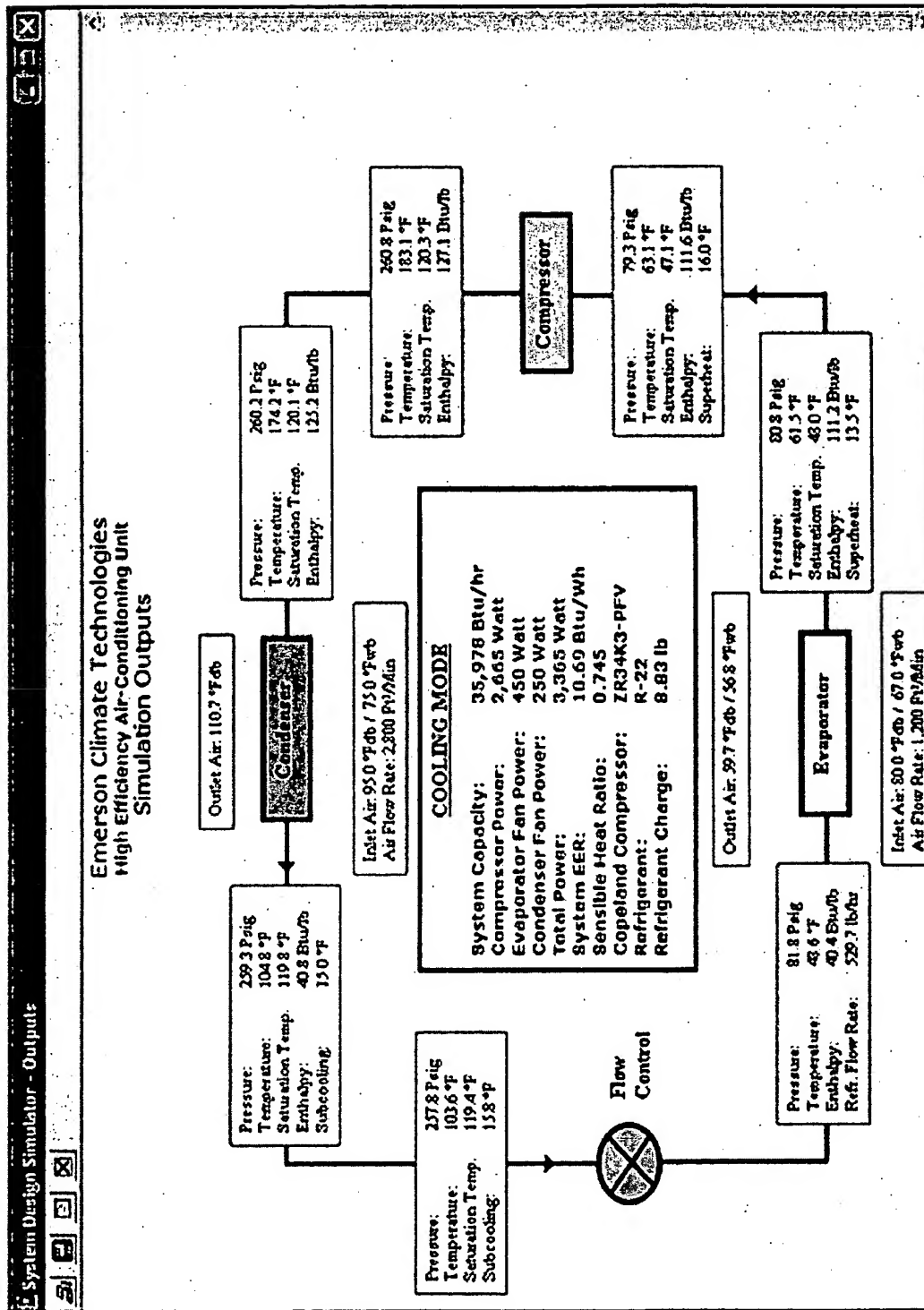


FIG 42

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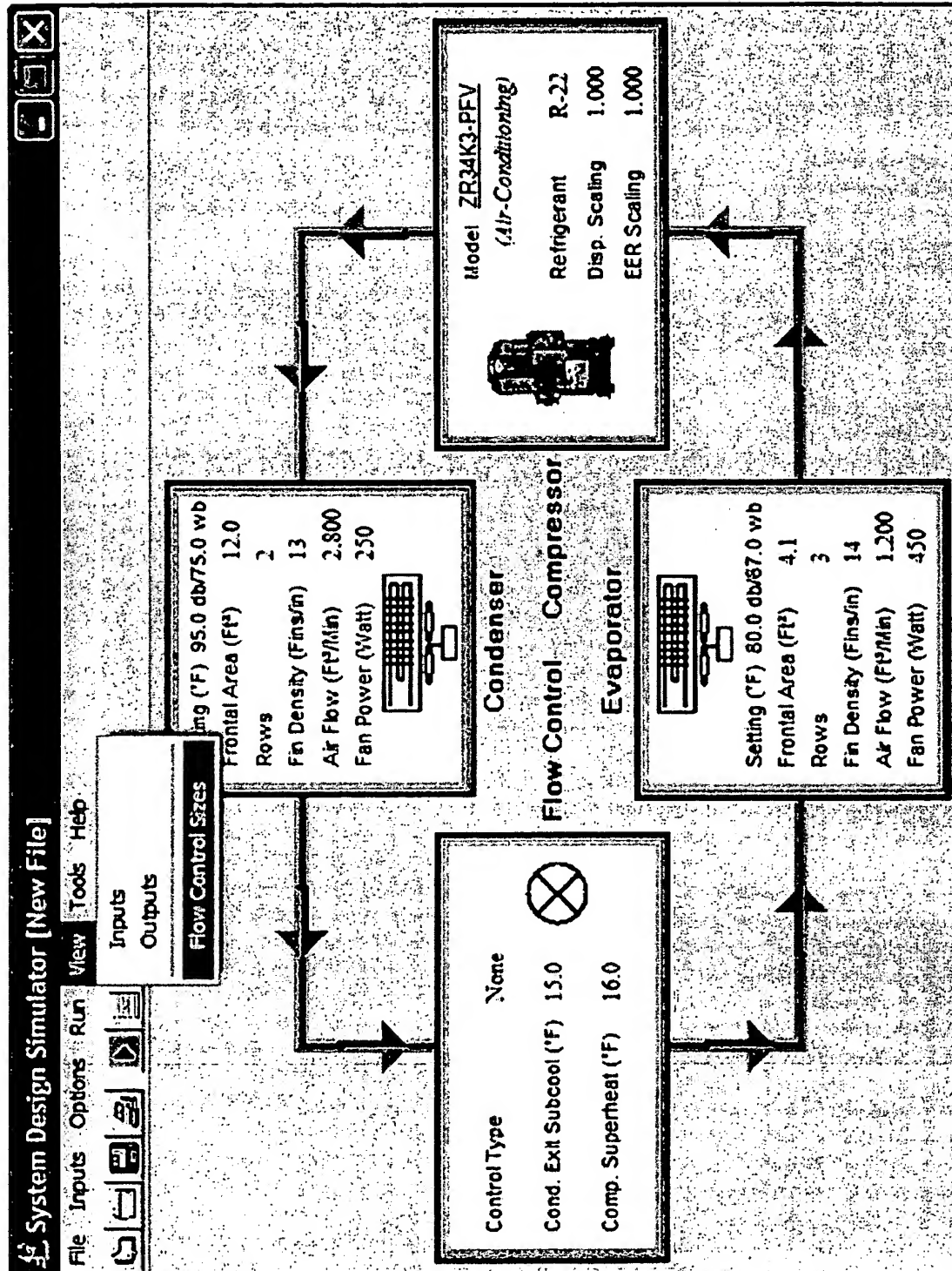


FIG 43

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Sizes: Flow Control Devices

Thermal Expansion Valve (TXV)

Rated Capacity of Thermal Expansion Valve (Ton)

1.7

Static Superheat Setting of TXV (°F)

6.0

Superheat at Rated Condition (°F)

11.0

Maximum Effective Operating Superheat (°F)

13.0

Bypass or Bleed Factor

1.15

Capillary Tube

Number of Capillary Tubes in Parallel

1

Inside Diameter of Capillary Tube (in)

0.113

Length of Capillary Tube (in)

80.0

Orifice

Number of Short Tube Orifices in Parallel

1

Inside Diameter of Short Tube Orifice (in)

0.072

Length of Short Tube Orifice (in)

0.5

Close

Emerson Flow Controls TXV Selection

FIG 44

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**Emerson Flow Controls Thermal Expansion Valve (TXV) Selection**

☒ Tied To System Model's Output      Search Criteria

Refrigerant: **R-22**      Valve Series: **All**      Percent Bleed: **15%**      Connection Type: **All**      Strainer: ☐ Clean Out

Distributor Type: **Orifice**      Pressure Drop: **35.0** Psig      Equaker Type: **External**      ☐ Show TXVs With Valve Loading

Evap. Temp (°F): **47.1**      Cond. Temp (°F): **120.3**      Liquid Temp (°F): **103.6**      Evap. Capacity (Btu/hr): **37514**      Search TXV

**Recommended Thermal Expansion Valves**      Valve Pressure: **141** Psig

| No. | TXV Model No.             | Capacity (Btu/hr) | Loading (%) | Port Type, Recommended Application   |
|-----|---------------------------|-------------------|-------------|--|
| 1   | AAEB - 2-1/2 - HW100 B028 | 44,400            | 84          | Conventional Port. Residential Air Conditioner, Commercial HVAC, Supermarket Cases, Walk-In Cooler, Ice Machine, Food Services |
| 2   | AFAEB - 2-1/2 - H B028    | 44,400            | 84          | Conventional Port. Supermarket Cases, Walk-In Cooler, Ice Machine  |
| 3   | BAEB - 2-1/2 - H B027     | 40,800            | 93          | Balanced Port. Bi-Flow, Heat Pump  |

Power Head Charge: **W100**      ☒ Adjustable      ☐ Internal Check Valve      Close

FIG 45

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The image shows a software window titled "Psychrometric Calculator". It is divided into two main sections: "Inputs" and "Outputs".

**Inputs:**

- Altitude (ft) [Sea Level]: 0
- Dry Bulb Temperature (°F): 80.0
- Wet Bulb Temperature (°F): 67.0

A "Calculate" button is located below the input fields.

**Outputs:**

- Relative Humidity (%): 51.14
- Humidity Ratio (grains/lb): 78.58
- Humidity Ratio (lb/lb): 0.011
- Specific Volume (ft³/lb): 13.85
- Enthalpy (Btu/lb): 31.51
- Dew Point Temperature (°F): 60.35
- Density (lb/ft³): 0.073
- Vapor Pressure (in Hg): 0.53
- Absolute Humidity (grains/ft³): 5.68

A "Close" button is located at the bottom right of the window.

FIG 46

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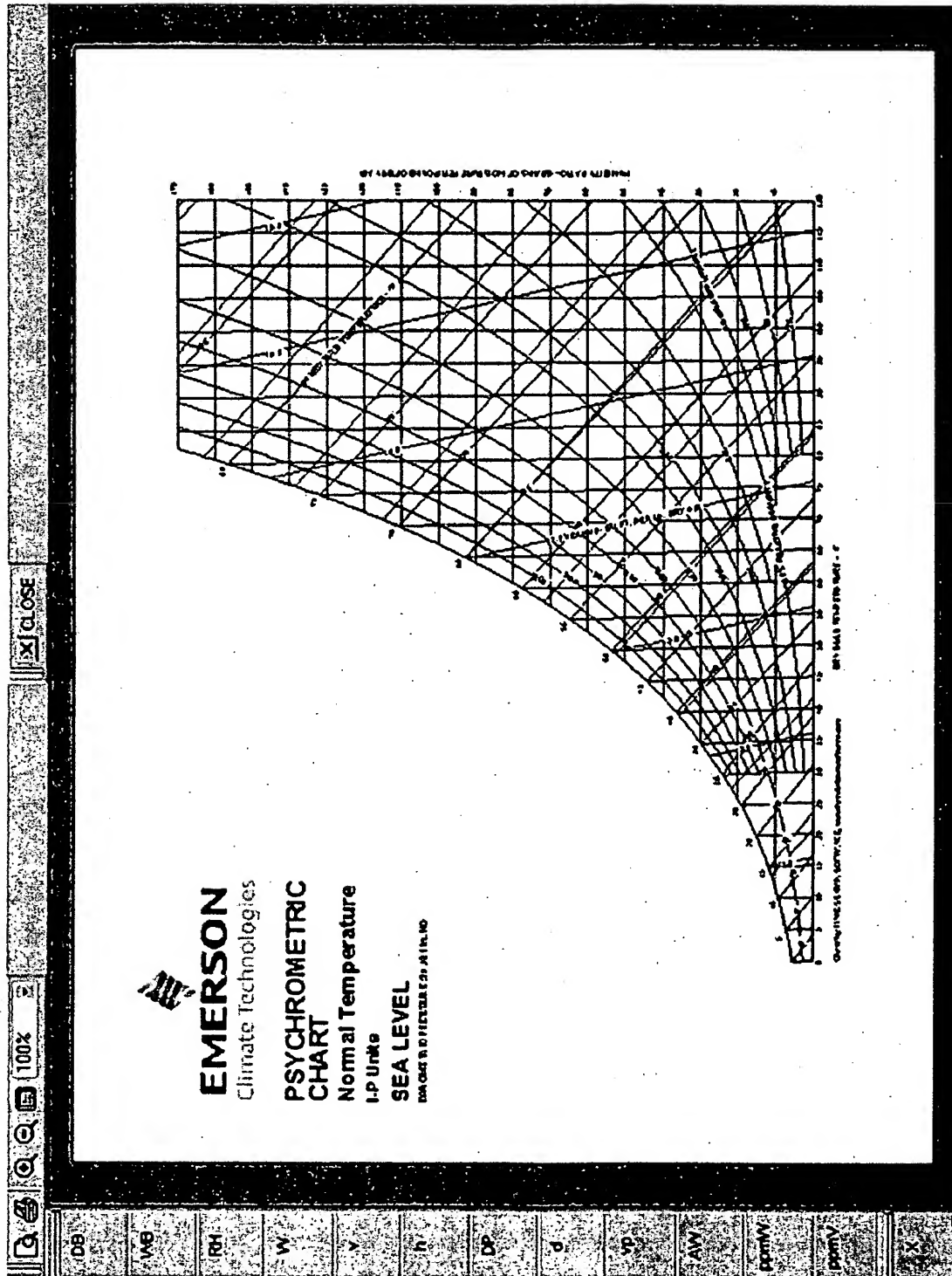


FIG 47



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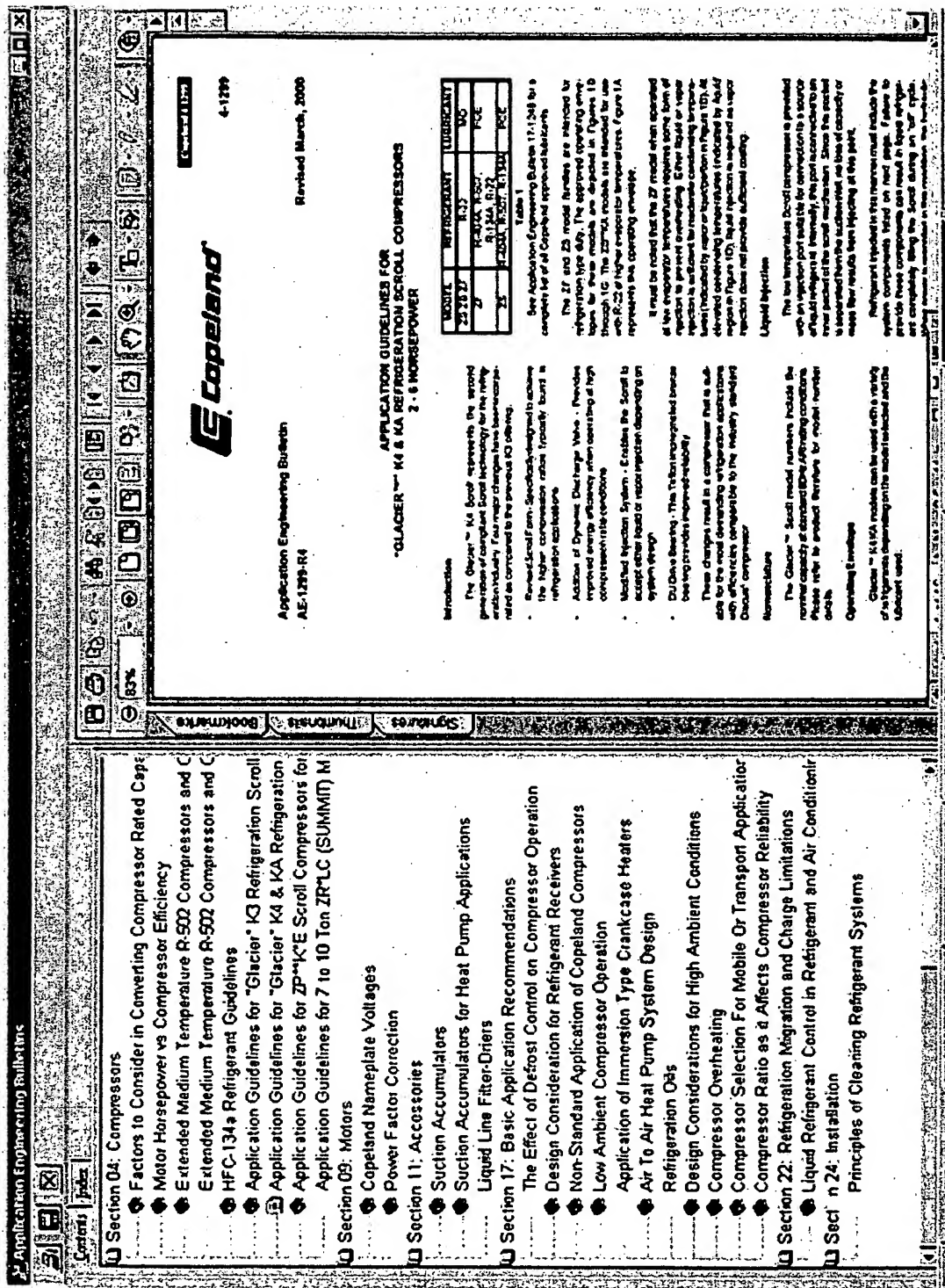


FIG 48